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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,163	12/10/2003	Mamoru Nakasuji	032154	5100

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EXAMINER


FERNANDEZ, KALIMAH

ART UNIT PAPER NUMBER

2881

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s) 	
	10/731,163	NAKASUJI ET AL.	
	Examiner	Art Unit	
	Kalimah Fernandez	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 24-26 is/are rejected.
- 7) ☒ Claim(s) 18-23 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12-23-04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claim 3 is objected to because of the following informalities: the use of the phrase " is designed to be" creates ambiguity since it fails to assert a positive limitation. Appropriate correction is required.
2. Claims 10 and 13 are objected to as failing to provide proper antecedent basis for the claimed subject matter. Correction of the following is required: "said objective lens."

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

4. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "the wafer by a distance not smaller than 'R' mm is not defined such that a reader can determine the metes and bound of the patent protection sought.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

And

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 6,392,333 issued to Veneklasen et al.

3. Veneklasen et al disclose an electron beam apparatus (col.1, lines 5-8).

4. Veneklasen et al disclose an electron gun having a cathode (14) and anode (24) (col.2, lines 43-48).

5. Veneklasen et al disclose the use of the electron gun within a SEM, which inherently includes the detection of secondary electron (col.1, lines 26-34).
6. Veneklasen et al disclose a means for optimizing irradiation of the electron beam from the electron gun onto a sample (col.1, lines 59-64; col.2, lines 56-64; col.3, lines 31-59).
7. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 5,811,819 issued to Ohshima et. al.
8. Ohshima et al disclose an electron beam source having cathode (col.1, lines 55-56) and an anode (71).
9. Ohshima et al disclose irradiating a sample and secondary electrons emanated from the sample are directed into a detector (108) (col.10, lines 30-50).
10. Ohshima et al disclose means for optimizing irradiation of the electron beam from the electron gun onto the sample (col.7, lines 45-56).
11. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by US Pat No 6,608,308 issued to Takagi et al.

Art Unit: 2881

12. Takagi et al disclose an electron beam apparatus having an electron gun having a cathode and anode; the detection of secondary electron (col.9, lines 5-21).

13. Takagi et al disclose a means for optimizing irradiation of the electron beam from the electron gun onto a sample (col.3, lines 54-59).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Veneklasen ('333) and in view of US Pat No 4,363,995 issued to Takigawa et al.

16. Veneklasen et al teach the claimed invention except for two-stage deflectors adapted to deflect and direct an electron beam emitted from the cathode in a specific direction, wherein the recitation

that the two-stage deflectors are “adapted to” perform a function is not a positive limitation but only requires the ability to so perform.

17. However, Takigawa et al teach two-stage deflectors (col.1, lines 24-28) adapted to deflect and direct an electron beam emitted from a cathode (11) in a specific direction having a specific crystal orientation allowing higher level of electron beam emission is out of alignment with the out of optical axis direction (col.2, lines 55-60; col.3, line 62-col.4, line 8; col.4, lines 20-26).

18. It would have been obvious to an artisan having ordinary skill at the time of this invention to combine Takigawa et al and Veneklasen because Takigawa et al teach the known advantages of LaB cathode along with improved beam control (col.1, lines 43-55). In addition, it has been held that the recitation that an element is “adapted to” perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. In *Re Hutchison*, 69 USPQ 138.

19. As per claim 3, Takigawa et al teach two-stage deflectors (col.1, lines 24-28) adapted to deflect and direct an electron beam.

20. As per claim 4, Takigawa et al teach the crystal of the cathode is boride metal (col.1, lines 64-65).

21. As per claim 5, Takigawa et al teach only an electron beam that has been emitted in a particular direction among a plurality of electron beams emitted in different directions from the electron gun is guided onto the sample and the electron beams emitted in the directions other than the particular direction (col.4, lines 35-64).

22. As per claim 6, Veneklasen et al teach controlling irradiation of the electron beam so as not to be irradiate undesirable region of a sample (col.3, lines 41-59).

23. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Veneklasen et al as applied to claim 1 above, and further in view of US Pat No 4,665,297 issued to Schiller et al.

24. Veneklasen et al teach the claimed invention except for the electron gun being operative under a space charge limited condition.

25. However, Schiller et al teach the desirability of an electron gun operative under a space charge limited condition (col. 1, lines 22-25; col.1, line 65-col.2, line 3).

26. It would have been obvious to an artisan having ordinary skill at the time of the invention to incorporate the teachings of Schiller into Veneklasen et al because the use of an electron gun operative under a space charge limited condition as taught by Schiller et al and

because Schiller et al teach the advantage of improved guidance of the electron beam (col.2, lines 27-33).

27. Claims 6-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohshima et al ('819) as applied to claim 1 above, and further in view of US Pat No 6,608,305 issued to Kin et al and US Pat No 6,586,158 issued to Dobisz et al.

28. Ohshima et al teach the claimed invention except for selectively irradiating a sample.

29. However, Kin et al teach the desirability of selective irradiation (col.2, lines 5-14).

30. It would have been obvious to artisan having ordinary skill at the time the invention was made to combine Kin et al and Ohshima et al because Kin et al teach the advantage of elimination of charge-up via selective deposition (col.1, lines 54-62; col.2, lines 1-4).

31. Neither Ohshima et al nor Kin et al explicitly teach the use of selective irradiation for the particular purpose of prevention of dielectric breakdown. Rather, Kin et al teach the desirability of selective irradiation for prevention of charge-up in respect to imaging (see col.3, lines 20-30). However, the charge-up process also can cause dielectric breakdown as described by Dobisz et al (see col.2,

line 55-col.2, line 6). Therefore, Kin et al's invention implicitly teaches the prevention of dielectric breakdown by selectively irradiating weak regions according to charging characteristics.

32. In regards to claim 6, Ohshima et al teach the emission and detection of secondary electrons from an electron beam irradiated region on a surface of a sample (see col.10, lines 30-67). Kin et al teach an optimizing means for controlling irradiation of the electron beam so as not irradiate the weak region (i.e. charged region) but irradiate exclusively the other regions of the sample (col.5, lines 41; col.6, lines 1-33).

33. As per claim 7, Dobisz et al teach the wide variety of sample including a gate oxide film of a transistor, which are inspected via a SEM (col.1, lines 12-43).

34. As per claim 8, Kin et al teach the scanning operation of the electron beam is adapted to be applied over an entire surface of the sample, while the electron beam may be prevented from irradiating/blanked when the electron beam is to scan the region relatively weak against dielectric breakdown (i.e. the charged area) (col.5, lines 36-41). Whereas, Ohshima et al teach a conventional SEM having a deflector (106) and aperture (100) capable of blanking

the electron beam. It has been held that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense.

35. As per claim 9, Kin et al teach an optimizing means for controlling the irradiation of the electron beam so that a different dose levels of electron beam is applied to each of the respective different regions so as to evaluate the surface of the sample (col.5, lines 5-10).

36. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat No 6,608,308 issued to Takagi et al and in view of US Pat No 5,324,950 issued to Otaka et al.

37. Takagi et al disclose an electron beam apparatus having an electron gun having a cathode and anode and the detection of secondary electron (col.9, lines 5-21).

38. Takagi et al disclose a means for optimizing irradiation of the electron beam from the electron gun onto a sample (col.3, lines 54-59).

39. As per claim 10, Takagi et al disclose an aperture (4 or 26) (col.9, line 15-16; col.12, lines 15-16) and an ExB separator (22) (col.11, lines 19-20). Takagi et al disclose the optimizing means, i.e.

projection lens system, sets a pivot point of deflection by a two-deflectors in such a location that minimizes a transverse chromatic aberration (col.9, lines 59-66; col.13, lines 1-9). Takagi et al does not teach an objective lens.

40. However, Otaka et al teach the desirability of using an electrostatic lens as an objective lens (col.2, lines 54-58), whereas Takagi et al teach an electrostatic lens (col.1, lines 8-14).

41. It would have been obvious to an artisan having ordinary skill at the time the invention was made to incorporate Otaka et al into Takagi et al because Otaka et al teach the advantage of improved resolution (col.2, lines 54-58).

42. As per claim 12, Takagi et al teach an aperture (4 or 26), but does not explicit teach a square shaped aperture. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a square shaped aperture, since such a modification would have involved a mere change in the shape of a component. A change in shape of an aperture is generally recognized as being within the level of ordinary skill in the art.

43. Claims 14- 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Veneklasen ('333) and US Pat No 4,426,577

issued to Koike et al. Veneklasen teaches the claimed invention except for an electron optical lens satisfying the recited relationship. However, Koike et al teach an objective lens (6); working distance (w); and bore diameter (h).

44. It would have been obvious to an artisan having ordinary skill at the time the invention was made to combine Veneklasen and Koike et al because Koike et al teach increased reliability without imposing restriction (see col.2, lines 34-45).

45. Neither Veneklasen nor Koike et al teach the recited relationship. Rather Koike et al teach the art-recognized effects of the result-effective variables: working distance (w) and bore diameter (h) (col.4, lines 4-66). It would have obvious to an artisan to modify the working distance (w) and bore diameter (h) according to the recited relationship if so desired, since Koike et al teach the general conditions of the claim and the particular relationship acts to discover the optimum or working ranges, which is only involves only routine skill in art.

46. Claims 16-17 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat No 6,608,308 issued to Takagi et al and in view of US Pat No 5,324,950 issued to Otaka et al as applied

Art Unit: 2881

to claim 10 above, and further in view of US Pat No 6,465,792 issued to Baptist.

47. The combination of Takagi et al and Otaka et al teach the claimed invention except for electrodes made of insulating material with a metal coating.

48. However, Baptist teach electrodes made of insulating material with a metal coating used in an electrostatic lens system (col.5, lines 36-49).

49. It would have obvious to an artisan having ordinary skill at the time the invention was made to incorporate Baptist into the combination of Takagi et al and Otaka et al because Baptist teach improved focusing capacity (col.2, line 65-col.3, line 12).

Allowable Subject Matter

50. Claims 18-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for

Art Unit: 2881

the indication of allowable subject matter: the prior art of record fails to teach or fairly suggest the claimed invention.

51. Specifically, no teaching or fair suggestion was found of the limitation "the thermionic emission cathode by evaluating a signal/noise ratio or a noise level detected in said detecting system during a period when said electron beam is irradiated against said sample while changing the heating electric power of said thermionic emission cathode" as recited in claim 18. US Pat No 3,885,194 issued Schumacher teaches optimizing means is constituted as means for determining a value for a heating electric power (col.1, lines 29-40; col.3, lines 34-49). Schumacher et al does not teach or fairly suggest the above-mentioned limitation.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kalimah Fernandez whose telephone number is 571-272-2470. The examiner can normally be reached on Mon-Tues 6:30-3:30; Wed-Thurs 8-5 and Fri.9am-6 pm.

Art Unit: 2881

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571-272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KF



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